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ABSTRACT

Guidelines are presented for institution administrators considering the initiation of programs to train energy-related technicians at the associate degree level. Two essential preliminary steps are outlined: Acquiring and analyzing all available information about the proposed field including national legislation and surveying the probable need for technicians in the area served by the institution. Study questions for the decision to develop a curriculum are followed by the caution that introducing and refining a new program takes a minimum of five years and also involves determining the need for additional facilities and the availability of qualified instructors. Potential areas for program development are then discussed individually for energy-related technicians in coal mining, beneficiation, and processing; petroleum extraction and refining; nuclear power production; solar energy; conversion of wind, geothermal or tidal energy; and possibly a new type of technician, the energy monitoring or control technician. A list of names and addresses of junior colleges with existing and planned energy-related technology programs is attached for each of four program areas: Coal, petroleum, nuclear, and solar. (BL)

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ENERGY RELATED TECHNOLOGY PROGRAMS AT THE NON-BACCALAUREATE POSTSECONDARY LEVEL

As administrators of technical institutes, community and junior colleges, technical colleges, area vocational and technical schools and divisions of four year colleges and universities consider the initiation of a program to prepare energy-related technicians or specialists at the associate degree non-baccalaureate level, the first essential step is to inform themselves or their designated staff leaders as completely as possible on the current state of the art in the various energy production or conversion fields. They must obtain the best possible estimates of the need for the technician or specialist specifically prepared to become employed in a special field of work.

These studies of the state of the art and current and probable future status of a given field of energy production or conversion first involves gathering and analyzing of all of the National, regional and local information available about the proposed field. This involves the acquisition and careful study of National legislation as it relates to the proposed field, present and estimated future status of the development in the field and particularly an estimate of the need for well-prepared technicians and specialists required to accomplish National goals and objectives. Valuable preliminary information as it relates to the overall status and needs in

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Presented by Walter J. Brooking, Education Program Specialist, Technical Education, U.S. Office of Education, at a National Invitational Conference sponsored by the Energy Research and Development Administration's Division of Labor Relations and the American Association of Community and Junior Colleges, October 27, at Atlanta, Georgia.

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a given field may be obtained from the Department of Labor's Bureau of Labor Statistics, Department of Commerce, Energy and Research Development Administration, Department of the Interior and the Trade and Technical publications of scientific and technical societies and producer associations specifically related to the field.

After the analysis of available National and regional information, if the administration of an institution identifies a program which might be initiated in that institution, the next essential step which must be taken is to make a comprehensive survey of the probably need for whatever specific type of technician is being considered in the area or region served by the institution.

Experience has shown that probably the most effective means of conducting such a survey is by constituting a local advisory committee with strong representation of potential employers, related labor organizations and community leaders with an interest in both the school's program and in providing the most appropriate educational programs to the community served by the institution.

The comprehensive survey must develop information about job opportunities that might exist for the kind of graduate the proposed program will produce. It must quantify the local opportunities for entry jobs and the prospects for later promotion into positions of greater responsibility with higher pay. Another kind of information to be gathered involves the elements of skill and knowledge the technician must have in order to perform successfully in the field for which he is being prepared. This

forms the basis for the curriculum.

The people best able to provide the first kind of information are those involved in long-range planning in organizations likely to employ graduates of the program being developed. This means that they are likely to be fairly high level executives. These individuals are usually easy to identify and recruit for an advisory committee.

Information about the work graduates will be doing and the training they will need can best be obtained from people who are presently planning and supervising this kind of work. They can often be identified and recruited with the help of the executive element on the advisory committee.

Before the administration can decide whether to recommend the introduction of the new curriculum, it will need information about laboratory and classroom facilities required to support the program and the availability of qualified instructors. The advisory committee will also be able to provide much of this information.

By going through the process of developing the new technology program with the aid of an advisory committee, the college will create an invaluable resource in the form of a group of interested and informed citizens who can be called on for help in a number of ways beyond those listed above. During this process, the college must be represented at the meetings of the advisory committee by persons who are at the highest level of administration. If possible boyh the Executive Officer and the Academic Dean should be present.

When the preliminary investigation of manpower needs has been completed, the administration will have to decide whether to proceed with the next step which is the development of a curriculum. If the study shows a probable need for thirty or more graduates a year for a period of several years in the geographic area served by the college, a decision in favor of taking the next step would appear proper. If the demand is likely to be less than this, the administration will have to justify further action on the basis of answers to the following questions:

1. Will the introduction of the new technology program tend to strengthen programs already existing in the college?
2. To what extent can existing facilities be used for the purpose of the program?
3. If such facilities are not available, what is likely to be the cost of new facilities?
4. Is there substantial evidence that the demand for graduates will increase within four to five years?
5. Is the need for manpower so critical that a high cost for preparing even a few technicians can be justified?

If a college introduces a technology program that has been in operation in other colleges for a period of years, it can obtain the benefit of experience the other colleges had and hereby save a great deal of time and effort. When a college is making a pioneering effort and developing an entirely new program, the administrator should expect that two to three years would be needed to gather information about employer and student interests, develop a new curriculum, plan and acquire facilities and obtain a competent teaching staff. It will take two more years to graduate the first group of students and begin

an evaluation of the program based on the experience employers have had with graduates. This means that to introduce a new program and to refine it through a process of evaluation will take a minimum of five years. This fact should be kept clearly in mind by a college administrator who is considering the possibility of introducing a new program.

POTENTIAL AREAS FOR PROGRAM DEVELOPMENT FOR ENERGY-RELATED TECHNICIANS

Coal Mining, Beneficiation and Processing

It is generally considered that the use of coal as a primary source of energy for the United States is one of great importance because of the Nation's extensive reserves. A relatively large proportion of the coal reserves in the Nation are high sulphur coal, the utilization of which will require the development of new processes in order to convert it to energy and remove the sulphur in the interest of minimumizing air pollution and sulphur contamination in its use. Large quantities of coal may be produced by strip mining; the remainder will require underground mining. The type of workforce required to produce coal by strip mining will require a different cadre of engineers, technicians and skilled workers in some degree than undergrounded mining because of the large amounts of overburden which must be removed and disposed of and finally replaced after the coal has been extracted. Benefication of strip-mined coal will generally require similar technicians to that which is mined underground, as will such processing as coking, briquetting, or conversion to gas and other products. Administrators of educational institutions who would consider preparing technicians for the coal mining industry must give very careful consideration to the mode of operation and importance of coal mining unions and the assurance of their support for the program and

acceptance of graduates of the program as workers whose school preparation provides tangible advantages to them when they seek employment in coal producing operations.

PETROLEUM EXTRACTION AND REFINING

The production and refining of petroleum is already a well-established industry and there are a few exemplary programs for the preparation of petroleum technicians. Exploration for petroleum and the exploitation of newly discovered fields probably requires more technicians whose preparation and identification does not include the name "petroleum." The major requirement is for technicians whose preparation is in the mechanical, civil, electromechanical, electrical and electronic, instrumentation or chemical technician designations.

Off-shore drilling has posed special problems requiring specialized technicians capable of supporting the engineers and managers of operations which are under water and some distance from the shore. The probable need for an increased number of these specialized technicians depends on the extent to which additional off-shore exploration and drilling is undertaken and the degree to which it is successful in locating new reserves of oil and gas. It is likely that off-shore drilling will increase, especially along the Atlantic shore.

NUCLEAR POWER PRODUCTION

It appears probable that nuclear power will be an increasingly significant source of energy in the United States at least for an interim period of several decades until the production of coal, solar energy and other sources of energy can be developed.

In light of these considerations the United States Office of Education in 1974 awarded an exploratory and developmental grant to the Technician Education Research Centers Southwest, Waco, Texas to examine the field of nuclear power production to determine what types of technicians might be prepared in a formal preparatory program of approximately two academic years to serve the needs of this growing industry.

Five types of nuclear technician occupations were identified as follows:

Reactor Operator Trainee

Radiation Protection Technician

Nuclear Instrumentation and Control Technician

Nuclear Materials Processing Technician

Quality Assurance and Quality Control Technician

Because of the potential hazards in nuclear power production and the comprehensive and detailed governmental controls of nuclear energy plants and processes three of these technician occupations are very specific and highly sophiscated requiring workers with highly specialized preparation. The nuclear operator trainee, the nuclear materials processing technician, and the radiation protection technician all require an understanding of nuclear physics, radiation protection, and a number of other related subjects which lend themselves to formal postsecondary education programming. In addition all must have a thorough understanding of the materials, physical layout, processes, machinery and inter-relationships of each element of the plant in which they will work.

Specialized technicians for nuclear plant instrumentation and control and for quality control also need some understanding of nuclear physics and radiation detection and control as a part of the preparation for their task.

Preparation of these types of nuclear technicians at present is largely done by employers under contract with private companies who specialize in training nuclear plant personnel rather than in public community colleges or technical institutes or technical colleges.

As a result of the initial research exploration and development grant, the U.S. Office of Education in 1976, provided a contract for the development of modules of instruction covering fifteen technical speciality courses for the nuclear operator trainee. These are being developed by the successful bidder, Technical Education Research Centers Southwest, Waco, Texa, under the guidance and with the assistance of the National Steering and Advisory Committee which served in the exploratory grant. The instruction modules are being written and editorially refined. They will be the subject of an additional contract for the evaluation, final writing, publication and dissemination at the end of the present contract in 1977.

The final report of the exploratory and development grant in nuclear technician occupations, "Final Report, Project No. V0003VZ - grant no. OEG-0-74-1679 Nuclear Technology" is available from Technical Education Research Centers, Southwest, P.O. 4395, Waco, Texas 76705. It contains a description of the five technician's work based on exhaustive task analyses, curriculum outlines and the identification of individual module components in each course.

Many of the modules and courses required for the nuclear operator trainee preparation are also required for the nuclear materials processing technician and the radiation protection technician program. Since the theoretical preparation which can be provided in a formal education setting, either away from the nuclear facility or on site, is only a part of the preparation of

of each of these types of technicians, the initiation and administration of such a program needs to be very closely coordinated and strongly supported by employers or potential employers. It is not unlikely that some students in the nuclear operator training program will already be employees of a nuclear power production company, where they are working in the plant learning the material balances, machinery, processes, and organization of the plant. These students need to master ghe nuclear science theory preparatory to ultimate licensure. It is likely that careful studies should be made of the possibilities of a cooperative "work part time-attend formal study part time" program when an educational institution is considering initiation of the new program in this field. This further emphasizes the need for close cooperation between the employers and the institution which provides the formal, theoretical preparatory training for nuclear operator trainees.

SOLAR ENERGY

It is generally accepted that solar energy in its present state of the art can feasibly be used in varying degrees in different parts of the country to produce significant amounts of energy for heating homes and institutional buildings. At the present state of the art it appears that almost all such installations can provide only a part of the energy necessary to heat or to cool the houses or buildings which they serve.

Solar energy installations currently in use depends upon capturing the heat of the sun's rays as they fall upon exposed surfaces by transmitting it to fluid within the collecting system, and pumping the heated fluid to reserve tanks from which the heat is withdrawn to moderate the temperature inside of the structure it serves. In this sense, these solar heating systems are analagous to other building heating or cooling systems where heat collected from the sun's

rays serves as a heating element instead of gas, oil or coal. In light of this, it appears likely that technicians who will find employment in the solar heating field will be very much like air conditioning, heating and refrigeration technicians, but will require a greater understanding of fluid pumps, circulating systems, and storage units than is needed for most air conditioning heating and refrigeration systems at the present time. Many more solar heating technicians will be needed.

CONVERSION OF WIND, GEOTHERMAL OR TIDAL ENERGY

It appears that the widespread and economically significant production and use of energy from wind, aside from the use of windmills in the earlier tradition of the development of rural areas in the United States, will depend upon further research and development of more sophisticated air foils and systems for capturing wind energy and converting it to useful energy.

Similarly, it would appear that further research needs to be done on conversion of tidal energy or geothermal energy, both of which tend to be localized in application, before either are significantly productive sources of energy. Thus there seems to be little evidence that there is a current need for the preparation of specialized technicians for any of these three fields at the present time although each has a potential for the future.

One outstanding characteristic of the preparation of the workforce for utilization of any of the major sources of energy, (coal, petroleum or nuclear energy) is that the number of specialized technicians which could be described as coal production technicians, petroleum technicians, nuclear energy technicians, or solar energy technicians represents only a small part of the

technicians and similar specialist work force required in the respective industries. With the possible exception of solar energy as it now is being used, each of the major energy industries requires more mechanical, instrumentation, chemical, metallurgical, electromechanical or civil engineering technicians in building and maintaining the plants and in processing the products than they do specialized technicians bearing the name of sources of energy in their title.

It is possible that another type of energy related technician which might be called the energy monitoring or control technician should be explored as another important potential objective for preparation of skilled technicians or specialists. The use of energy in homes, hospitals, schools, government buildings and other establishments including factories and industrial plants may in some cases be very wasteful. A specialist prepared to inventory the energy used and the efficiency with which it is used, and to establish and maintain control of its use might well be one of the more important individuals in the ultimate use of energy in this nation. The need for such skilled individuals obviously exists in all major communities. Such individuals would need to be comprehensively prepared along the lines of the electromechanical technician, and when appropriately prepared could probably demonstrate their value to many employers who would seek their services. This technology appears yet to be developed, but may well be one of the most important for community colleges, technical institutes and other postsecondary educational institutions.

In summary, it is evident that the entire field of energy production and conservation uses some specially prepared technicians or specialists at the

present time and undoubtedly in the future will need more. For administrators of educational institutions at the postsecondary non-baccalaureate level who would undertake programs in any of the major fields of energy production or utilization, it seems evident that comprehensive and careful study (using all of the advisory capability of potential employers, labor organizations and other interested persons) to become as fully informed as possible and to obtain as much support from outside of the institution as possible is necessary before a program is initiated.

In the energy field, as in others, high quality programs for educating technicians cannot be short-term or transitory. If they are to prepare skilled technicians or comparable specialists in a given field of applied science for challenging employment and growth as responsible employees, they must be seriously considered and well planned and administered programs. It usually takes a minimum of five years and many thousands of dollars to establish a new program, assemble a staff with facilities and graduate the first two classes. When these graduates are successfully employed and confidently advertising their success to their peers and parents the program is well started. A poor program is by far the most expensive of all because it costs almost as much as a good one; wastes the time and effort of students and staff; and worst of all, disappoints potential employers and disillusions students and their parents.

It is therefore apparent that when considering whether or not to initiate a program the administrator of an institution needs to gather all the information possible on the potential objective which is under study and to come to a final decision based on all of the information and reflecting all the support

which he can expect or count on as he begins the new initiative. It should not be expected that because a major study of a potential objective is made that the decision will be made to initiate and pursue the objective. In many cases the decision should be "not now, perhaps in the future, and maybe never."

The attached listing of Energy Related Technology Programs was prepared for the Energy Research and Development Administration's Division of Labor Relations and the American Association of Community and Junior Colleges by Oak Ridge Associated Universities' Manpower Development Division, Oak Ridge, Tennessee. October 1976.

COMMUNITY AND JUNIOR COLLEGES
COAL MINING TECHNOLOGY PROGRAMS

Existing Programs

1. Beckley College
   John W. Sanders, President
   P.O. Box AG
   Beckley, West Virginia 25801

2. Belmont Technical College
   Paul S. Tien, President
   Interstate 70 at Route 331
   St. Clairsville, Ohio 43950

3. Bluefield State College
   Billy L. Coffindaffer, President
   219 Rock Street
   Bluefield, West Virginia 24701

4. Casper College
   Ted Cross, Director
   Career Studies
   125 College Drive
   Casper, Wyoming 82601

5. College of Eastern Utah
   W. Kent Eden, Director
   Mining Technology
   451 East 4 North
   Price, Utah 84501

6. Colorado Mountain College
   Elbie L. Gann, President
   Richards Avenue
   Glenwood Springs, Colorado 81601

7. Fairmont State College
   H. Dotson Cather, Assoc. Profesor
   Mining Engineering Technology
   Fairmont, West Virginia 26554

8. Hazard Community College
   J. Marvin Jolly, Director
   Hazard, Kentucky 41701

9. Indiana Vocational Technical College
   Richard L. Davidson, Director
   Terre Haute, Indiana 47802

10. Lees Junior College
    Don F. Landrum, Director
    Career Education
    Jackson, Kentucky 41339

11. Madisonville Community College
    George W. Kyle, Project Director
    Mining Technology Cooperative
    Madisonville, Kentucky 42431

12. Morehead State University
    Orris L. Watson, Assoc. Professor
    Mining Technology
    University Boulevard
    Morehead, Kentucky 40351

13. Mountain Empire Community College
    Revonda Williams
    Assistant to the President
    Drawer 700
    Big Stone Gap, Virginia 24219

14. Northern Wyoming Community College
    Gordan Ward, President
    Sheridan, Wyoming 82801

15. Pennsylvania State University
    Lee Saperstein, Chairman
    Mining Engineering
    University Park, Pennsylvania

16. Pikeville College
    John Waddell, Dean
    Pikeville, Kentucky 41501

17. Rend Lake College
    W. Travis Martin, Jr., President
    Rural Route 1
    Ina, Illinois 62846

18. Southeast Community College
    Larry D. Stanley, President
    Cumberland, Kentucky 40823

19. Southeastern Illinois College
    Harry W. Abell, President
    Rural Route 4, College Drive
    Harrisburg, Illinois 62946

20. Southern West Virginia Community College
    William E. Barrett, Academic Dean
    Williamson, West Virginia 25661

COAL MINING TECHNOLOGY PROGRAMS

21. Southwest Virginia Community College
Michael N. Bishara, Chairman
Engineering Division
P.O. Box SUCC
Richlands, Virginia 24641

22. University of West Virginia
Duane A. Letcher, Asst. Professor
Mining Extension Service
Morgantown, West Virginia 26505

23. Wabash Valley College
John Gwaltney, President
Mt. Carmel, Illinois 62863

24. Walker State Technical College
J. T. Aldridge, Coordinator
Coal Mining
P.O. Drawer L
Sumiton, Alabama 35148

25. West Virginia Institute of Technology
Daniel M. Clonch, Chairman
Mining Engineering Technology
Montgomery, West Virginia 25136

COMMUNITY AND JUNIOR COLLEGES
COAL MINING TECHNOLOGY PROGRAMS

Planned Programs

1. Bismarck Junior College
Ralph Werner, President
Schafer Heights
Bismarck, North Dakota 58501

2. Community College of Allegheny County
John B. Hirt, President
610 Smithfield Street
Pittsburgh, Pennsylvania 15222

3. Flathead Valley Community College
Donald G. Lindahl, President
P.O. Box 1174
Kalispell, Montana 59901

4. Hocking Technical College
John L. Light, President
Route 1
Nelsonville, Ohio 45764

5. New Mexico State University at Carlsbad
Gary P. Sims, Director
2900 W. Church Street
Carlsbad, New Mexico 88220

6. Northern Wyoming Community College
David Hamilton, Director
Occupational Division
Sheridan, Wyoming 82801

7. Rhode Island Junior College
William F. Flanagan, President
400 East Avenue
Warwick, Rhode Island 02886

8. Roane State Community College
W. Carroll Marsalis, Director
Career Education - Patton Lane
Harriman, Tennessee 37748

9. Sue Bennett College
Earl F. Hays, President
London, Kentucky 40741

0. Trinidad State Junior College
Thomas W. Sullivan, President
600 Prospect Street
Trinidad, Colorado 81082

11. University of Minnesota Technical College
Stanley D. Sahlstrom, Provost
Crookston, Minnesota 56716

12. Westmoreland County Community College
H. Mark Jones, Program Assistant
Institutional Development Division
College Station, Armbrust Road
Youngwood, Pennsylvania 15697

13. West Virginia Institute of Technology
Donald L. Hagen, Dean
Montgomery, West Virginia 25136

14. West Virginia Northern Community College
Daniel B. Crowder, President
87 Fifteenth Street
Wheeling, West Virginia 26003

15. Williamsport Area Community College
Paul McWuay, Director
Engineering and Design
1005 West Third Street
Williamsport, Pennsylvania 17701

COMMUNITY AND JUNIOR COLLEGES
PETROLEUM TECHNOLOGY PROGRAMS

Existing Programs

1. Butler County Community College
   John W. Bacon, Director
   Institutional Research
   College Drive
   Butler, Pennsylvania 16001

2. Casper College
   Ted Cross, Director
   Career Studies
   125 College Drive
   Casper, Wyoming 82601

3. Delgado Junior College
   Edwin A. O'Neal, Chairman
   Dept. of Petroleum Engineering Tech.
   615 City Park Avenue
   New Orleans, Louisiana 70119

4. Hocking Technical College
   Walter P. Selvage, Program Director
   Oil Well Training
   Route #1
   Nelsonville, Ohio 45764

5. Lee College
   Jim D. Sturgeon, President
   P.O. Box 818
   Baytown, Texas 77520

6. Lincoln Trail College
   Dwight Link, Dean of Instruction
   Route #3
   Robinson, Illinois 62454

7. Midland College
   Ed Poulter, Instructor
   3600 N. Garfield
   Midland, Texas 79701

8. Muskingum Area Technical College
   Jerry Plaster, Assistant Professor
   1555 Newark Road
   Zanesville, Ohio 43701

9. Northwestern Michigan College
   Clovis B. (Toby) Ferguson,
   Dean of Instruction
   1701 East Front Street
   Traverse City, Michigan 49684

10. Tanana Valley Community College
    Dois Dallas, Coordinator
    Career and Technical Education
    Constitution Hall
    Fairbanks, Alaska 99701

11. Texas Southern University
    Joshua Hill, Director
    Petroleum Project
    3201 Wheeler Street
    Houston, Texas 77004

12. University of Pittsburgh at Bradford
    W. E. Keder, Director
    Petroleum Technology
    Bradford, Pennsylvania 16701

13. Ventura College
    Steven Hill, Instructor
    4667 Telegraph Road
    Ventura, California 93003

14. Western Texas College
    Robert L. Clinton, President
    Snyder, Texas 79549

COMMUNITY AND JUNIOR COLLEGES
PETROLEUM TECHNOLOGY PROGRAMS

Planned Programs

1. Ashland Community College
   Bill J. Vice, Associate
   Director for Instruction
   1400 College Drive
   Ashland, Kentucky 41101

2. Belleville Area College
   Clyde Washburn, Dean
   Career Oriented Division
   2500 Carlyle Road
   Belleville, Illinois 62221

3. Colorado Mountain College
   Elbie L. Gann, President
   Richards Avenue - 3000 114 Road
   Glenwood Springs, Colorado 81601

4. Colorado Northwestern Community College
   James H. Bos, President
   Kentucky Drive
   Rangely, Colorado 81648

5. Delaware Technical and Community
   College - Southern Campus
   Charlotte H. Purnell, Acting Dean
   Develpment
   Georgetown, Delaware 19947

6. Hocking Technical College
   Walter P. Selvage, Program Director
   Oil Well Training
   Route #1
   Nelsonville, Ohio 45764

7. Merced College
   Lowell F. Barker, President
   3600 M Street
   Merced, California 95340

8. San Antonio College
   Truett L. Chance, Dean
   1300 San Pedro Avenue
   San Antonio, Texas 78284

9. Schoolcraft College
   William A. Ryan, Head
   Department of Geology
   18600 Haggerty Road
   Livonia, Michigan 48151

10. Seward County Community Junior
    College
    R. Wade Kirk, President
    Box 1137
    Liberal, Kansas 67901

COMMUNITY AND JUNIOR COLLEGES
NUCLEAR ENERGY TECHNOLOGY PROGRAMS

Existing Programs

1. Aiken Technical Education Center
Robert Epps, Dean of Instruction
Post Office Drawer 696
Aiken, South Carolina 29801

2. Amarillo College
Wallace Johnston, Dean of Technology
Box 447
Amarillo, Texas 79178

3. Central Florida Community College
James H. Walters, Director
Division of Applied Sciences
Post Office Box 1388
Ocala, Florida 32670

4. Central Virginia Community College
Edgar H. Dewell, Associate Professor
Nuclear Technology
Wards Road South
Lynchburg, Virginia 24502

5. Chabot College
Reed L. Buffington, President and
District Superintendent
25555 Hesperian Boulevard
Hayward, California 94545

6. Chattanooga State Technical Community
College
D.R. Stone, Head
Division of Life and Health Sciences
4501 Amnicola Highway
Chattanooga, Tennessee 37406

7. Community College of Beaver County
Dr. Paul Ohm, Vice President, Academics
Center Grange Road
Monaca, Pennsylvania 15061

8. Florence-Darlington Technical College
Wayne D. Leonard, Department Head
Nuclear Engineering Technology
Post Office Drawer 8000
Florence, South Carolina 29501

9. Hartford State Technical College
Dale C. Robinson, Nuclear Technology
401 Flatbush Avenue
Hartford, Connecticut 06106

10. Midlands Technical College
R. B. Neel, Department Head
Nuclear Engineering Technology
Post Office Drawer Q
1135 Carter Street
Columbia, South Carolina 29204

11. Pennsylvania State University -
Altoona Campus
John L. Leathers, Director
Route 4, Box 1
Altoona, Pennsylvania 16601

12. Pennsylvania State University-
Hazleton Campus
Frank C. Kostos, Director
Highacres
Hazleton, Pennsylvania 18201

13. Roane State Community College
W. Carroll Marsalis, Chairman
Career Education
Patton Lane
Harriman, Tennessee 37748

14. Shoreline Community College*
Ward Teel, Instructor
16101 Greenwood Avenue North
Seattle, Washington 98133

15. Terra Technical College
Dennis L. Smith, Instructor
Nuclear Power Technology
1220 Cedar Street
Fremont, Ohio 43420

16. Texas State Technical Institute-
James Connally Campus
Clay G. Johnson, Vice President
for Instruction
Waco, Texas 76705

* Also have a planned program

NUCLEAR ENERGY TECHNOLOGY PROGRAMS

17. Texas State Technical Institute-
Rio Grande Campus
Oscar Hinojosa, Manager of Instruction
Post Office Box 2628
Harlingen, Texas 78550

18. Tri-County Technical College*
Karl O. Koebberling, Department Head
Nuclear Technology
Post Office Box 87
Pendleton, South Carolina 29670

19. Wentworth Institute
Paul Witherell, Dean of Instruction
550 Huntington Avenue
Boston, Massachusetts 02115

* Also have a planned program

COMMUNITY AND JUNIOR COLLEGES
NUCLEAR ENERGY TECHNOLOGY PROGRAMS

Planned Programs

1. Charles County Community College
   Carl M. Schwing, Executive Director
   Middle Atlantic Applied Technology Institute
   Post Office Box 910
   La Plata, Maryland 20646

2. Cincinnati Technical College
   Charles Warman, Vice President
   3520 Central Parkway
   Cincinnati, Ohio 45223

3. Clackamas Community College
   Charles K. Scott, Division Chairman
   Science, Math and Engineering
   19600 South Molalla Avenue
   Oregon City, Oregon 97045

4. Community College of Allegheny County-South
   Pearley Cunningham, Assistant Professor
   1750 Clairton Road
   West Mifflin, Pennsylvania 15122

5. Connors State College
   James Klemm, Academic Dean
   Warner, Oklahoma 74469

6. Kirkwood Community College
   Vernon R. Pickett, Associate Superintendent of Education
   6301 Kirkwood Boulevard
   Cedar Rapids, Iowa 52406

7. Middlesex County College
   Victor Zarzycki, Assistant Vice President
   Academics and Studies
   Mill Road
   Edison, New Jersey 08817

8. New Hampshire Technical Institute
   David E. Larrabee, Sr., Director
   Fan Road
   Concord, New Hampshire 03301

9. Northeastern Oklahoma Agricultural and Mechanical College
   J. D. Wilhoit, Assistant Dean
   Second and "I" Streets, Northeast
   Miami, Oklahoma 74354

10. Pennsylvania State Unitersity-McKeesport Campus
    Duane Prosser, Professor of Engineering
    University Drive
    McKeesport, Pennsylvania 15132

11. Prince George's Community College
    Joseph P. Basaman, Associate Dean
    Scientific and Service Technology
    301 Largo Road
    Largo, Maryland 20870

12. Richland Community College
    Henry H. Brown, Director
    Institutional Studies
    100 N. Water Street
    Decatur, Illinois 62523

13. San Jose City College
    Lois A. Callahan, Dean of Instruction
    2100 Moorpark Avenue
    San Jose, California 95128

14. Shoreline Community College*
    Ward Teel, Instructor
    16101 Greenwood Avenue North
    Seattle, Washington 98133

15. Skagit Valley Community College
    James M. Ford, Dean of Instruction
    2405 College Way
    Mt. Vernon, Washington 98273

16. South Oklahoma City Junior College
    Robert P. Harrington, Dean
    Career Development
    7777 South May Avenue
    Oklahoma City, Oklahoma 73159

17. SUNY Agricultural and Technical Colleges - Alfred Campus
    Gary Fraser, Dean
    School of Engineering Technology
    Alfred, New York 14802

* Also have an existing program

NUCLEAR ENERGY TECHNOLOGY PROGRAMS

Planned Programs

18. Tri-County Technical College*
Karl O. Koebberling, Department Head
Nuclear Technology
Post Office Box 87
Pendleton, South Carolina 29670

19. Valencia Community College
Robert Carmody, Department Chairman
Technician Engineering Department
Post Office Box 3028
Orlando, Florida 32802

20. Wake Technical Institute
R.C. Koontz, Vice President
Academic Affairs
Route 10, Box 200
Raleigh, North Carolina 27603

21. Washtenaw Community College
Joseph M. Miller, Dean
4800 East Huron River Drive
Ann Arbor, Michigan 48106

22. Westmoreland County Community College
Robert Meeder, Grants Officer
College Station, Armbrust Road
Youngwood, Pennsylvania 15697

* Also have an existing program

COMMUNITY AND JUNIOR COLLEGES
SOLAR ENERGY TECHNOLOGY PROGRAMS

NOTE: There were no established Solar Energy Technology Programs reported in the study of energy related programs in 1976.

Planned Programs

1. American River College
Kenneth Boettcher, President
One Barnard Drive
Sacramento, California 95841

2. Anson Technical Institute
Phil Whitaker, Chairman
Construction Occupations Dept.
R.R. #1, Box 186
Ansonville, North Carolina 28007

3. Bakersfield College
John J. Collins, President
1801 Panorama Drive
Bakersfield, California 93305

4. Central Arizona College
John A. Palmer, Instructor
Woodruff at Overfield Road
Collidge, Arizona 85228

5. Central Wyoming College
Ralph Schaefer, Instructor
505 East Park
Riverton, Wyoming 82501

6. Clark County Community College
Dave Camarow, Director
Solar Energy Technology
3200 East Cheyenne Avenue
North Las Vegas, Nevada 89030

7. Clark Technical College
Andrew E. Hartman, Chairman
Engineering and Natural Sciences
570 East Leffels Lane
Springfield, Ohio 45505

8. Coastal Carolina Community College
James L. Henderson, Jr., President
222 Georgetown Road
Jacksonville, North Carolina 28540

9. Cochise College
John R. Edwards, Jr., President
Bisbee Douglas Highway
Douglas, Arizona 85607

10. Community College of Allegheny County
John B. Kirt, President
610 Smithfield Street
Pittsburgh, Pennsylvania 15222

11. Community College of Denver-North Campus
Donald Mankenberg, Dean
Occupational Studies
1001 East 62nd Avenue
Denver, Colorado 80216

12. Connors State College
James Klemm, Academic Dean
Warner, Oklahoma 74469

13. Delaware Technical/Community College
William A. Faucett, Campus Director
Route #7, Churchman Road
P.O. Box 1260
Newark, Delaware 19702

14. Evergreen Valley College
Clyde Herrick, Dean of Instruction
3095 Yerba Buena Road
San Jose, California 95121

15. Florissant Valley Community College
% Bill G. Aldridge, Program Manager
Modes Task Force
National Science Foundation
1800 G Street, N.W.
Washington, D.C. 20550

16. Hartford State Technical College
Louis Galbiata, Dean
401 Flatbush Avenue
Hartford, Connecticut 06106

17. Indian Valley College
Ernest H. Berg, President
720 Ignacio Boulevard
Novato, California 94947

18. Midland College
Charles Wakefield, Chairman
Engineering
3600 North Garfield
Midland, Texas 79701

Solar Energy Technology Programs

Planned Programs

19. Mountain View College
Bill Sorrells, Assistant Dean
Occupational Education
701 Elm Street
Dallas, Texas 75202

20. Motlow State Community College
Harry D. Wagner, President
P.O. Box 860
Tullahoma, Tennessee 37388

21. Nassau Community College
Ed Trunk, Assistant Professor
Department of Engineering,
Physics and Technology
Stewart Avenue
Garden City, New York 11530

22. Navarro College
C. Paul Green, Director
Resource Development
P.O. Box 1170
Corsicana, Texas 75110

23. New Hampshire Technical Institute
David E. Larrabee, Director
Fan Road
Concord, New Hampshire 03301

24. New Hampshire Vocational
Technical College
Richard M. O'Donnell,
Associate Professor
1066 Front Street
Manchester, New Hampshire 03102

25. New Mexico State University
Dona Ana County Occ. Education Branch
Wade Fredrickson, Coordinator
of Instruction
Campus Box 3DA
Las Cruces, New Mexico 88003

26. Northeastern Oklahoma A&M College
D. D. Creech, President
Second and I Streets, N.E.
Miami, Oklahoma 74354

27. Northern Virginia Community College
Donald L. Solomon, Program Head
Air-Conditioning, Refrigeration
and Heating
8333 Little River
Annandale, Virginia 22003

28. Oakland Community College
Joseph E. Hill, President
2480 Opdyke Road
Bloomfield Hills, Michigan 48013

29. San Diego Community College District
Bob J. Bethel, Coordinator
Vocational Education
3375 Camino Del Rio South
San Diego, California 92108

30. San Jose City College
Silas Upton, Chairman
Air-Conditioning, Solar,
Refrigeration Technology
2100 Moorpark Avenue
San Jose, California 95121

31. Scott Community College
Robert (Bob) Illingsworth, Director
Research and Development
Belmont Road
Bettendorf, Iowa 52722

32. Snead State Junior College
Virgil B. McCain, President
Drawer D
Boaz, Alabama 35957

33. South Oklahoma City Jr. College
Dale L. Gibson, President
777 South May Avenue
Oklahoma City, Oklahoma 73159

34. Southwestern Technical Institute
Donald N. Irwin, Dean of Instruction
P.O. Box 95
Sylva, North Carolina 28779

Solar Energy Technology Programs

Planned Programs

35. Springfield Technical Community College
Robert F. Tinker, Professor
One Armory Square
Springfield, Massachusetts 01105

36. SUNY A&T College - Canton
Michael J. Danehy, Dean
Engineering Technology Division
Canton, New York 13617

37. Tri-County Technical College
Don C. Garrison, President
P.O. Box 87
Pendleton, South Carolina 29670

38. Wake Technical Institute
Robert W. LeMay, Jr., President
Route #10, Box 200
Raleigh, North Carolina 27603

39. Western Iowa Technical Community College
James B. McCord, Director
Technical/Vocational and General Education
P.O. Box 265
Sioux City, Iowa 51102